

FACT SHEET

This fact sheet is a companion document to the draft National Pollutant Discharge Elimination System (NPDES) Permit No. WA0021083. The Department of Ecology (Ecology) is proposing to issue this permit which will allow discharge of treated municipal wastewater to waters of the state of Washington.

This fact sheet explains the nature of the proposed discharge, Ecology's decisions on limiting the pollutants in the wastewater, and the regulatory and technical basis for those decisions.

<u>Applicant:</u>	City of Vader P.O. Box 189 Vader, WA 98593
<u>Facility Name and Address:</u>	Vader Wastewater Treatment Plant End of A Street Vader, Washington
<u>Type of Treatment:</u>	Three Cell Lagoon
<u>Discharge Location:</u>	Olequa Creek Latitude: 46° 23' 44" N. Longitude: 122° 57' 23" W.
<u>Water Body ID Number:</u>	WA-26-1092

The Code of Federal Regulations, Title 40, Part 122, Section 21 (40 CFR 122.21) requires a permittee with a currently effective permit to submit a new application 180 days before the existing permit expires. The previous NPDES permit expired on October 13, 1985. The City of Vader (Vader) submitted the most recent NPDES permit application to Ecology on September 18, 1995.

I. WASTEWATER TREATMENT PLANT AND DISCHARGE INFORMATION

Wastewater Treatment Plant Description

According to a 1977 facilities plan titled, *Town of Vader, Final Sewage Facility Plan 1976*, which was approved by the Environmental Protection Agency (EPA) on January 24, 1977, and by Ecology on January 14, 1977, Vader has provided wastewater collection services since 1915. The original collection system was constructed using 6 and 8 inch diameter vitrified clay pipe. This collection system discharged into Olequa Creek, without providing wastewater treatment, at three different outfalls.

The original system remained as constructed until 1958. At this time, Vader constructed an interceptor consisting of 2600 feet of 8, 10, and 12-inch diameter concrete pipe and a one-cell lagoon to treat the wastewater. This eliminated the three separate outfalls that discharged untreated wastewater to the creek. The lagoon, with a depth of 5 feet and a surface area of approximately 4 acres, provided chlorine disinfection and discharged treated wastewater to Olequa Creek.

The next upgrade to the collection system occurred in 1974. Vader installed 1600 feet of polyvinyl chloride (PVC) pipe in the collection system.

In 1976, Vader received a Step 1 planning grant from the EPA to study the collection system and wastewater treatment plant. The facilities planning activity included a study of the collection system to evaluate its condition and identify sources of infiltration/inflow (I/I). The facilities plan recommended rehabilitation of parts of the collection system and converting the single-cell lagoon to a three-cell lagoon, with aeration in the first cell. The facilities also recommended constructing a comminutor and bar screen, installing effluent flow metering, constructing a chlorine contact basin, constructing a laboratory building, and constructing a diffuser on the outfall.

Vader then received Step 2 (design) and Step 3 (construction) grants to proceed with the recommendation in the facilities plan. Ecology's files do not contain records of the design and construction activities other than an Ecology comment letter regarding a review of the plans and specifications. This unsigned letter has the date July 27, 1977. Several letters in Ecology's files discuss extending the construction grant until late 1980.

The recommended changes to the wastewater treatment plant were done, with construction completed in 1980. Information regarding the recommended rehabilitation of the wastewater collection system does not exist. The following table presents the 1977 facilities plan wastewater treatment plant design criteria:

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Table 1. Vader WWTP Design Criteria

Average Wet Weather Flow	0.13 MGD
Peak Daily Wet Weather Flow	0.38 MGD
BOD ₅ Influent Loading	148 lb/d
TSS Influent Loading	unavailable
Population	674

WWTP = wastewater treatment plant
MGD = million gallons per day
BOD₅ = 5 day biochemical oxygen demand
TSS = total suspended solids
lb/d = pounds per day

The collection system and wastewater treatment plant have apparently remained unchanged since the work funded by the grant was completed in 1980.

Previous Permit Limitations and Summary of Compliance With the Previous Permit

The previous permit for this treatment plant was issued on October 13, 1980. This permit had effluent limitations for BOD₅, TSS, pH, and fecal coliform bacteria. The discharge monitoring reports (DMRs) indicate compliance with the permit limitations. However, Vader has had two periods when the DMRs were not submitted to Ecology nor are records available to evaluate the discharge during these periods.

Ecology performed the latest Class I permit compliance inspection on February 21, 1996. Appendix B has a copy of the inspection report.

Wastewater Characterization

Vader submitted an application for permit renewal to Ecology on September 18, 1995. The application characterized the average daily discharge for the parameters listed in Table 2.

Table 2. Vader WWTP Effluent Characterization
Average Daily Discharge

Effluent Flow	0.04 MGD
BOD ₅	17 mg/l
TSS	13 mg/l
Chlorine	0.4 mg/l

mg/l = milligrams per liter

Ecology's DMR review indicates that the flow increases from approximately 0.03 MGD during the summer to 0.25 MGD during the winter, wet weather season. Also, the wastewater treatment plant does not usually discharge during the months of June through September.

II. PROPOSED PERMIT LIMITATIONS AND CONDITIONS

Federal and state regulations require that effluent limitations in NPDES permits must be either technology-, water quality-, or human health-based. Technology-based limitations are set by regulation (40 CFR 133, and Chapters 173-220 and 173-221 WAC). Water quality-based limitations for the protection of aquatic life and human health are based upon compliance with the Water Quality Standards (Chapter 173-201A) and the National Toxics Rule (Federal Register, V. 57, No. 246, Tuesday, December 22, 1992), respectively. The more stringent of these three criteria must be chosen for each of the parameters of concern.

Technology-Based Effluent Limitations

Chapter 90.48 of the Revised Code of Washington (RCW 90.48) requires the use of all known, available and reasonable methods to prevent and control the pollution of the waters of the state of Washington. WAC 173-220 and WAC 173-221 implement RCW 90.48 by setting discharge standards which represent all known, available, and reasonable methods of prevention, control, and treatment for domestic wastewater facilities which discharge to waters of the state. In addition to the state code and regulations, the draft permit limits the discharge of pollutants in accordance with 40 CFR 133.102, 133.103, and 133.105.

The federal and state technology-based limitations follow:

Concentration based limitations for BOD₅ and TSS

BOD₅. Both 40 CFR 133.102(a) and WAC 173-221-040(1) describe the minimum level effluent quality required for BOD₅. The wastewater treatment plant effluent shall comply with the following BOD₅ limitations: The 30-day average shall not exceed 30 mg/l. The 7-day average shall not exceed 45 mg/l. The 30-day average percent removal shall not be less than 85 percent.

TSS. Both 40 CFR 133.102(b) and WAC 173-221-040(1) describe the minimum level effluent quality required for TSS. The wastewater treatment plant effluent shall comply with the following TSS limitations: The 30-day average shall not exceed 30 mg/l. The 7-day average shall not exceed 45 mg/l. The 30-day average percent removal shall not be less than 85 percent.

However, 40 CFR 133.101(g) allows “facilities eligible for treatment equivalent to secondary treatment” to be eligible for consideration for effluent limitations described for treatment equivalent to secondary treatment in 40 CFR 133.105 if: (1) the BOD₅ and TSS effluent concentrations consistently achievable through proper operation and maintenance (40 CFR 133.101(f)) of the treatment plant exceed the minimum level of the effluent quality set forth in 40 CFR 102(a) and (b), (2) a lagoon, or waste stabilization pond, system is used as the principal process, and (3) the treatment plant provides significant biological treatment of municipal wastewater.

Forty (40) CFR 133.105 describes the minimum level of effluent quality attainable by municipal wastewater treatment plants for treatment equivalent to secondary treatment for the parameters BOD₅, TSS, and pH. Forty (40) CFR 133.105(a) and (b) require achievement of the following for BOD₅ and TSS: (1) the 30-day average shall not exceed 45 mg/l, (2) the 7-day average shall not exceed 65 mg/l, and (3) the 30-day average percent removal shall not be less than 65 percent.

As stated in 40 CFR 133.103(c) the director of Ecology can, with EPA approval, adjust the minimum levels of effluent quality set forth in 133.105(b)(1), (b)(2), and (b)(3) for treatment works subject to this

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part to conform to TSS effluent concentrations achievable with waste stabilization ponds, provided that the lagoon system is the principal secondary treatment process and the TSS values in 40 CFR 105(b) cannot be achieved. The federal regulation defines the term “TSS concentrations achievable with waste stabilization ponds” as a TSS value which is equal to the effluent concentration achieved 90 percent of the time within a state or appropriate contiguous geographical area by waste stabilization ponds achieving the levels of effluent quality for BOD₅ specified in 40 CFR 105(a)(1).

Finally, 40 CFR 133.105(f) requires more stringent limitations when adjusting permits if: (1) for existing treatment plants the permitting authority determines the 30-day average and 7-day average BOD₅ and TSS effluent concentrations achievable through proper operation and maintenance of the treatment works, based on an analysis of the past performance of the treatment plant, would enable the Permittee to achieve more stringent limitations. Forty (40) CFR 133.101(f) defines effluent concentrations consistently achievable through proper operation and maintenance as: (1) for a given pollutant parameter, the 95th percentile value for the 30-day average effluent quality achieved by a treatment works in a period of at least two years, excluding values attributable to upsets, bypasses, operational errors, or other unusual conditions, and (2) a 7-day average value equal to 1.5 times the value derived for the 30-day average.

The state regulations for alternative discharge standards and effluent limitations for waste stabilization ponds, WAC 173-221-050(2), is similar to the federal regulations except that these regulations apply only to lagoon systems which either have a design capacity less than 2 million gallons per day or have received, prior to the effective date of the state regulation, Ecology approval for a greater design capacity.

Also, in 1977 Ecology determined that the TSS concentrations achievable with waste stabilization ponds are a 30-day average of 75 mg/l and a 7-day average of 112 mg/l.

The state regulation in WAC 173-221-050(5) requires that alternative effluent limitations must meet all of the following conditions: (1) the effluent shall not cause water quality violations, (2) the Permittee shall identify effluent concentrations consistently achievable through proper operation and maintenance, (3) the Permittee shall demonstrate that industrial wastewater does not interfere with the domestic wastewater treatment plant, (4) the wastewater treatment plant must treat flow and loadings within the Ecology approved design criteria, (5) the Permittee must complete an analysis of whether seasonal alternative effluent limits are more appropriate than year-round, and (6) the wastewater treatment plant must meet all other permit requirements and conditions.

The following steps summarize the process required by the state and federal regulations to determine BOD₅ and TSS effluent limitations from a lagoon, or waste stabilization pond, system:

1. Using the past two years of DMR data, calculate the effluent concentrations of BOD₅ and TSS consistently achievable through proper operation and maintenance. The regulation defines this as the 95th percentile value for the 30-day average effluent quality achieved by a wastewater treatment plant in a period of at least 24 consecutive months.
2. Compare the effluent concentrations consistently achievable through proper operation and maintenance to the minimum effluent limitations in 40 CFR 102. If the consistently achievable operation and maintenance values are greater, then proceed to use the alternative effluent limitations in 40 CFR 133.105 and the TSS adjustment allowed by 40 CFR 133.103(c). If the consistently achievable operation and maintenance values are less than the minimum effluent limitations in 40 CFR 102 then use the limitations in part 102.

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3. If the effluent concentrations consistently achievable through proper operation and maintenance are less than the alternative effluent limitations in 40 CFR 133.105 and the TSS adjustment allowed by 40 CFR 133. 103(c), then the permit writer uses the effluent concentrations consistently achievable through proper operation and maintenance for the permit limitations.

The previous NPDES permit had 30-day average BOD₅ and TSS limitations of 30 mg/l and 75 mg/l, respectively. The present permit writer does not have record of how these limitations were established. Because the available DMR data precludes calculation of “effluent concentrations consistently achievable through proper operation and maintenance” and the available DMR data indicates that the discharge has consistently met the 30-day average BOD₅ limitations of 30 mg/l, the permit writer will use best professional judgment to propose this value as the permit limitation.

For percent removal of BOD₅, the available data indicate the treatment plant can achieve 85 percent removal. Since an alternative BOD₅ limitation is not proposed the draft permit requires 85 percent removal of BOD₅. Consistent monitoring could indicate alternative BOD₅ limitations are necessary. If that occurs, Ecology can modify the permit consistent with the regulations.

The permit writer will also use best professional judgment to recommend the 30-day average TSS limitation of 75 mg/l because data are unavailable to evaluate the analyses required by the regulations. The available data, however, indicate that the discharge could meet a more restrictive TSS limitation. However, loadings to the wastewater treatment plant will probably remain at present levels and the lagoon system cannot be operated in any other matter so a more restrictive TSS limitation results in only a value change on the permit and would have no realistic effect.

Thus, the proposed permit limitations for BOD₅ and TSS are:

Table 4. Proposed BOD₅ and TSS Limitations

Parameter	30 Day Average (mg/l)	7 Day Average (mg/l)
BOD ₅ ^a	30	45
TSS	75	112

^aThe average monthly effluent concentration of BOD₅ shall not exceed 30 mg/l and 15 percent of the respective monthly average influent concentration

Mass Based Limitations for BOD₅ and TSS

The draft permit’s effluent mass limitations for BOD₅ and TSS are determined by evaluating two different conditions. In the first condition the permit writer calculates the effluent mass limitations using the maximum month design flow and the effluent concentration limitation in the following mathematical expression:

BOD₅: Average wet weather design flow (0.13 MGD) x Concentration limit (30 mg/L) x 8.34 (lb/d/mg/l/MGD) = mass limit (33 lb/d)

Weekly average effluent mass limitation = 1.5 x monthly loading (33 lb/d) = 50 lb/d

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TSS: Average wet weather design flow (0.13 MGD) x Concentration limit (75 mg/L) x 8.34 (lb/d/mg/l/MGD) = mass limit (81 lb/d)

Weekly average effluent mass limitation = 1.5 x monthly loading (81 lb/d) = 122 lb/d

The second evaluation for BOD₅ mass limitations requires multiplying the percentage removal requirement by the influent design loading. Federal and state regulations do not require a percent removal of TSS. For BOD₅ the calculations follow:

Influent design loading (148 lb/d) x Percent removal requirement (0.15) = 22.2 lb/d

Weekly average effluent mass limitation = 1.5 x monthly loading (22.2 lb/d) = 33.3 lb/d

The second evaluation has the more restrictive mass limitations for BOD₅ so the draft permit specifies those limitations. The following table presents the proposed mass limitations for BOD₅ and TSS:

Table 5. Proposed BOD₅ and TSS Mass Based Limitations

Parameter	30 Day Average (lb/d)	7 Day Average (lb/d)
BOD ₅	22.2	33.3
TSS	81	122

pH. 40 CFR 133.103(c) and WAC 173-221-040(3) describe the minimum level of effluent quality required for pH. The effluent pH value shall be maintained within the limits of 6.0 to 9.0 unless the WWTP demonstrates that: Inorganic chemicals are not added to the waste stream as part of the treatment process; contributions from industrial sources do not cause the pH of the effluent to be less than 6.0 or greater than 9.0; and the discharge does not cause water quality violations outside of an approved dilution zone.

Fecal coliform bacteria. WAC 173-221-040(2) contains the minimum level of effluent quality required for fecal coliform bacteria. The effluent shall not exceed a monthly geometric mean of 200 organisms per 100 ml, and a weekly geometric mean of 400 organisms per 100 ml.

Water Quality-based Effluent Limitations

WAC 173-201A, Water Quality Standards for Surface Waters of the State of Washington, establishes water quality standards for the state's surface waters consistent with the public's health and enjoyment, and the propagation and protection of fish and wildlife that use the waters. The water use and quality criteria, Sections -030 through -140, were established in conformance with present and potential water uses and considered the natural water quality potential and limitations of the waters. In addition the EPA issued 91 numeric water quality criteria for the protection of human health. These regulations require that waste discharge permits, including NPDES permits, are conditioned so the authorized discharge will not cause a violation of the water quality standards.

General Water Use and Criteria Classes

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Section -030 lists the general water use and criteria classes for waters of the state. Olequa Creek, in the vicinity of the outfall, is identified in Section -130 as a Class A water. Class A water shall meet or exceed the requirements for all or substantially all of the following characteristic uses:

water supply (domestic, industrial, and agricultural); stock watering; fish migration, rearing, spawning and harvesting; wildlife habitat; recreation; sport fishing; commerce and navigation.

In addition to the general characteristics and characteristic use requirements, Section -030 lists numeric water quality criteria for fecal coliform bacteria, dissolved oxygen, total dissolved gas, temperature, pH, and turbidity. This section also limits acute and chronic toxicity, radioactivity, and other deleterious materials and prohibits the impairment of the water's aesthetic value.

Toxic Substances

Chapter 173-201A-040 WAC states that toxic substances shall not be introduced above natural background levels in waters which have the potential, either singularly or cumulatively, to adversely affect characteristic water uses, cause acute or chronic toxicity to the most sensitive biota dependent upon the waters, or adversely affect public health, as determined by Ecology. This section requires chemical testing, acute and chronic toxicity testing, and biological assessments, as appropriate, to evaluate if the characteristic uses are being affected. Subsection (3) of Section -040 lists acute and chronic numerical criteria for several chemical elements and chemical compounds for the protection of aquatic life.

The National Toxics Rule specifies the numeric criteria for human health protection. Numeric criteria in the National Toxics Rule and the Water Quality Standards are used to calculate permit limitations.

Antidegradation

The antidegradation policy, WAC 173-201A-070, states discharges shall not degrade the existing quality of the receiving water. When the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the natural conditions shall constitute the water quality criteria.

Mixing Zones

Discharges of wastewater treated to AKART standards may not comply with the water quality criteria at the point of discharge. WAC 173-201A allows the discharge permit to locate and size a mixing zone if: (1) AKART is fully applied to the discharge prior to being authorized a mixing zone, (2) the mixing zone determination considers the critical discharge conditions, (3) mixing zones will not be allotted unless supporting information indicates the zones would not have a reasonable potential to cause a loss of sensitive or important habitat, substantially interfere with the existing or characteristic uses of the water body, result in damage to the ecosystem, or adversely affect public health as determined by Ecology, (4) the discharge will not cause a violation of water quality criteria beyond the boundary of the mixing zones, (5) and the size of a mixing zone and the concentrations of pollutants present shall be minimized.

For example, the maximum size for a mixing zone in a river shall comply with the following: (1) the zone shall not extend downstream for a distance from the outfall of greater than 300 feet plus the depth of the water over the discharge, or extend upstream for a distance of over 100 feet; (2) not utilize over 25 percent of the flow; or (3) shall not occupy greater than 25 percent of the cross sectional width of the

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water body. Chronic water quality standards must be met at the boundaries of the dilution zone described.

In addition, the regulation requires the Permittee to demonstrate, to Ecology's satisfaction, that the concentration, duration, and frequency of exposure to the discharge will not create a barrier to the migration or translocation of indigenous organisms to a degree that has the potential to cause damage to the ecosystem. The regulation contains acute criteria for toxic materials which, if complied with, demonstrate a migration barrier or translocation should not occur for most species.

The regulation describes a zone where acute criteria may be exceeded. Again, using the river mixing zone example, the zone where acute criteria may be exceeded shall comply with the most restrictive combination of the following: (1) not extend beyond 10 percent of the distance to the upstream and downstream boundaries of an authorized mixing zone; (2) not utilize greater than 2.5 percent of the flow; and (3) not occupy greater than 25 percent of the cross-sectional width of the river.

Exceedences of the size criteria may be considered under the specific conditions listen in Subsection (12) and (13).

The diffuser constructed in the late 1970s became plugged and Vader presently has a bank discharge from the outfall pipe. Ecology could authorize a mixing zone to this situation but the permit writer does not have the information available to make a mixing zone determination. The proposed permit will first require testing to determine if the discharge has exceedences of the water quality standards. If the discharge does exceed a water quality standard or standards then the permit will require Vader to evaluate effluent mixing within Olequa Creek during the critical condition. The effluent testing and mixing study would then be used to evaluate compliance with the water quality standards.

Evaluation for Compliance With the Water Quality Standards

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, can have an adverse affect near the point of discharge where the concentration is greatest, while a pollutant such as BOD₅ can have the most adverse affect some distance away from the discharge. The method of calculating water quality-based effluent limitations varies with the point at which the pollutant has its maximum effect.

Water quality-based limitations are calculated for the waterbody's critical condition and considers the variability of the pollutant concentrations in both the effluent and the receiving water. The critical condition represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota and existing or characteristic water body uses. For western Washington this typically occurs during the months of August and September. The Vader wastewater treatment plant, according to past DMRs, does not discharge during these months. The availability of discharge data does not allow the permit writer to determine the critical condition.

BOD₅. The impact of BOD₅ on the receiving water is modeled using the Streeter-Phelps Model, at critical receiving water conditions and with the proposed effluent limitation for BOD₅. The available information does not allow the permit writer to evaluate impacts of BOD₅ to the receiving stream dissolved oxygen. The proposed permit has a testing schedule that will allow the permit writer to evaluate compliance with the dissolved oxygen standard after two or three years of data collection.

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Temperature and pH. The impact of the effluent's pH and temperature on the receiving water are modeled using the following data: dilution factor, upstream temperature, upstream pH, upstream alkalinity (as mg CaCO₃/L), effluent temperature, effluent pH 6 and 9, and effluent alkalinity (as mg CaCO₃/L). Again, data are not available to evaluate compliance but the permit will require testing to have this information available within two or three years.

Fecal coliform bacteria. Ecology calculates the concentration of fecal coliform bacteria by mixing analysis using the technology-based limit of 400 colonies per 100 ml and the dilution factor. The technology-based limit will allow compliance with the water quality standards for fecal coliform bacteria. Data are unavailable but should be within the next few years to evaluate compliance.

Reasonable Potential to Exceed Water Quality Criteria for Aquatic Life Protection. Federal regulation (40 CFR 122.44) requires NPDES permits to contain effluent limits for toxic chemicals whenever there is a reasonable potential for those chemicals to exceed the water quality criteria. This process occurs concurrently with the application of technology-based effluent limits. Discharges with technology-based effluent limits defined in regulation are not exempted from meeting the water quality standards or from having water quality-based effluent limits.

Vader's effluent has the toxic pollutants chlorine and probably ammonia. Federal regulations require Ecology to determine the reasonable potential of these pollutants to cause a violation of the water quality standards. The determination of the potential of a chemical element or compound to violate the water quality standards partially depends upon the amount of mixing that occurs in an assigned mixing zone.

When Ecology evaluates the reasonable potential for exceeding water quality the permit writer will use the procedure in the EPA document *Technical Support Document for Water Quality-based Toxics Control* (EPA/505/2-90-001, PB91-127415, March 1991) and Ecology's *Permit Writer's Manual*. Ecology cannot evaluate reasonable potential for exceeding water quality standards because data are not available. Because of the treatment system and the past history of no discharge during the critical condition the discharge could possibly comply with the water quality standards at the end of the pipe. The draft permit requires testing so that Ecology will be able to evaluate the discharge's compliance with the water quality standards approximately two years after permit issuance.

Reasonable Potential to Exceed Water Quality Criteria for Human Health Protection. The National Toxics Rule lists 91 numeric water quality criteria for the protection of human health. Ecology must evaluate the a discharge to determine if it has a reasonable potential to violate these criteria.

Human health-based water quality criteria incorporate several exposure and risk assumptions. These include: (1) a 70-year lifetime of daily exposures, (2) a 6.5 grams per day ingestion rate for fish or shellfish, (3) 2 liters/d ingestion rate for drinking water, and (4) a one-in-one million excess cancer risk for carcinogenic chemicals. These exposure assumptions will provide a safe level of protection for most individuals. However, the criteria do not account for additive or synergistic effects of multiple contaminants on human health, and they contain the assumption that 100 percent of exposures are from ingesting fish or waters and no exposure occurs from air, other foodstuffs, or groundwater or public drinking water supplies. The criteria address a combination of cancer and non-cancer effects. If a chemical has both cancer and non-cancer effects, the effect that results in the most stringent criteria is the criteria issued in the NTR.

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The process of performing a reasonable potential determination is similar to that used for evaluating the effluent's compliance with the water quality standards. The only differences involve the model inputs for the critical flow conditions and the criterion values.

A reasonable potential determination is conducted for each chemical in the discharge that: (1) has an associated human health-based criterion, and (2) has been found in the discharge during the last permit cycle. The procedure for performing the evaluations is specified in the *Permit Writers Manual*. The discharge must comply with the human health-based criteria at the boundary of the chronic mixing zone. The *Permit Writers Manual* requires using the average design flow for the carcinogens and the dry weather design flow for the non-carcinogens. For receiving water conditions the *Permit Writers Manual* specifies using the harmonic mean for evaluating the carcinogens and the 30-day, 5-year (30Q5) low flow condition for evaluating the non-carcinogens.

Vader has not monitored for the chemical compounds listed in the NTR. At this time, Ecology does not anticipate the effluent to contain these compounds in toxic quantities. If data becomes available that indicate differently, Ecology will further evaluate the discharge for compliance with the human health criteria.

Whole Effluent Toxicity

The water quality standards require that the effluent will not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, so this approach is called whole effluent toxicity (WET) testing. The WET testing requirement is authorized by RCW 90.48.520, 40 CFR 122.44, and WAC 173-205 and measures both acute toxicity and chronic toxicity.

Acute toxicity tests measure death as the significant response to the toxicity of the effluent. Acute toxicity tests provide an indication of the potential lethal effect of the effluent to organisms in the receiving environment. The expired permit, issued in 1980, did not require toxicity testing.

Chronic toxicity tests measure various sublethal toxic responses such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles.

The permit writer evaluated the Vader wastewater treatment plant and influent loadings according to WAC 173-205-040 to determine the necessity for whole effluent toxicity testing. According to the regulation's criteria unidentified sources of toxicity are not expected to be present in the effluent from the Vader wastewater treatment plant. In accordance with the regulation the draft permit does not require whole effluent toxicity testing. Ecology may require toxicity testing if data indicates the effluent has unidentified toxicity.

Sediment Quality

Ecology has promulgated aquatic sediment standards, WAC 173-204, to protect aquatic biota and human health. These standards state that Ecology may require permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400). Ecology has determined

through a review of the effluent characteristics that this discharge has no reasonable potential to violate the sediment management standards.

Monitoring and Reporting

Effluent monitoring, recording, and reporting are required (WAC 173-220-210) to verify that the effluent complies with the permit limitations.

The monitoring and testing schedule is detailed in the permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of the *Permit Writers Manual* for municipal wastewater treatment plants with lagoons as the method of secondary treatment and to require testing to obtain data for evaluating compliance with the water quality standards. This frequency of monitoring is considered to be the minimum frequency to document compliance.

Prevention of Wastewater Treatment Plant Overloading

Overloading of the treatment plant may result in a violation of the terms and conditions of the permit. To prevent this from occurring, Chapter 90.48.110 RCW and WAC 173-220-150 require the Permittee to take the actions detailed in permit requirement S.4. to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Condition S.4 restricts the influent flow and loadings to values no greater than the Ecology approved design criteria.

Operation and Maintenance

The proposed permit contains condition S.5. as authorized under RCW 90.48.110, WAC 173-220-150, WAC 173-230, and WAC 173-240-080. Ecology includes the condition to ensure proper operation and regular maintenance of equipment and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

Residual Solids Handling

To prevent water quality problems occurring from the improper storage, handling, or disposal of solid wastes, the Permittee is required in permit condition S.7. to handle and dispose of all residual solids in accordance with the requirements of RCW 90.48.080 and the jurisdictional health department; Ecology-required management plan (WAC 173-240-060(3)(m)); state water quality standards; and applicable federal laws.

Biosolids Use and Disposal

Vader must comply with federal, state, and local jurisdictional health department requirements for the use or disposal of sewage sludge and biosolids. The federal regulations published in 40 CFR part 503 establish technical standards for land application, surface disposal, and incineration. Final use or disposal of biosolids or sewage sludge requires a permit. Typical of lagoon systems for small towns, the sludge has never been removed since startup of the treatment system.

Pretreatment

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To provide more direct and effective control of pollutants discharged, several municipal permittees have been delegated permitting, monitoring, and enforcement authority for industrial users that discharge to their treatment system. Ecology oversees the delegated Industrial Pretreatment Program to assure compliance with the federal pretreatment regulations (40 CFR Part 403) and categorical standards and state regulations (RCW 90.58 and WAC 173-216).

Vader does not have significant industrial users to required initiating a delegated pretreatment program. Condition S8 of the draft permit specifies the prohibition of the discharge into the collection system of wastes with specific deleterious characteristics.

General Conditions

General Conditions are based directly on state and federal law and regulations and have been standardized for all NPDES permits issued by Ecology.

Permit Modifications

Ecology may modify this proposed permit after issuance to impose numerical limitations, if necessary to meet water quality criteria, human health criteria, or sediment quality standards based on new information obtained from sources such as inspections, effluent monitoring, and outfall inspections. Ecology may also modify this permit as a result of new or amended state or federal regulations.

APPENDIX A--DEFINITIONS

Acute Toxicity--The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is a product of the oxidation of nitrogenous materials in wastewater. Unionized ammonia is toxic to aquatic organisms and instream organisms use dissolved oxygen to oxidized ammonia to nitrate, thereby reducing the concentration of dissolved oxygen available to other organisms such as fish. Ammonia also increases the amount of chlorine needed to disinfect wastewater.

BOD₅--Five day Biochemical Oxygen Demand is the quantity of oxygen utilized by a mixed population of microorganisms in an aerobic oxidation for 5 days at a controlled temperature of 20°C. BOD is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Chlorine--Chlorine is used to disinfect treated municipal wastewater of pathogens harmful to human health. It is toxic to aquatic life.

Chronic Toxicity--The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Class 1 Inspection--A walk-through inspection of a facility that includes a visual inspection and some examination of facility records. It may also include a review of the facility's record of environmental compliance.

Class 2 Inspection--A walk-through inspection of a facility that includes the elements of a Class 1 Inspection plus sampling and testing of wastewaters. It may also include a review of the facility's record of environmental compliance.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the wastewater treatment plant discharges and the flow within a water body is at its lowest.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Mixing Zone-- volume of receiving water that surrounds an effluent discharge within which water quality criteria may be legally exceeded. The volume of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (Chapter 173-201A WAC).

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National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington state permit writers are joint NPDES/State permits issued under both state and federal laws.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

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APPENDIX B -- PERMIT COMPLIANCE INSPECTION REPORT